CLAIMS

Amend the claims as follows.

1. (Previously Presented) A signal processing apparatus comprising:

a plurality of receiving elements configured to receive a composite signal indicative of a plurality of symbols transmitted, substantially simultaneously, from a plurality of remote transmission elements; and

a processing device configured to iteratively decode each of the plurality of symbols contained in the composite signal, wherein the composite signal is represented, at least in part, by a channel gain matrix, wherein the processing device is further configured to perform a decomposition of the channel gain matrix into an orthogonal matrix Q and a triangular matrix R, and wherein the plurality of symbols are decoded within a constrained enumeration formalism of the triangular matrix R.

2. (Previously Presented) The apparatus according to claim 1, wherein the processing device is arranged to define an enumeration constraint for use in the constrained enumeration formalism, and wherein the enumeration constraint comprises a number of entries in the triangular R matrix over which the plurality of symbols are enumerated.

3. (Cancelled)

4. (Cancelled)

5. (Previously Presented) The apparatus according to claim 1, wherein the processing device is further configured to determine a most probable symbol by enumerating across all symbol conditional probabilities for each possible symbol.

6. (Previously Presented) The apparatus according to claim 5, wherein the processing device is further configured to convert a symbol conditional probability to a bit level logarithmic likelihood ratio (LLR).

7. (Currently Amended) The apparatus according to claim 6, further comprising ~~including~~ a parallel to serial conversion device configured to convert parallel, bit level LLR's into a single stream of LLR's.

8. (Currently Amended) The apparatus according to claim 7, further comprising ~~including~~ a deinterleaving device configured to deinterleave the parallel, bit level LLR's from the single stream of LLR's.

9. (Currently Amended) The apparatus according to claim 6, further comprising ~~including~~ a decoding device configured to apply iterative soft input soft output (SISO) decoding to single bit LLR's to determine the plurality of symbols.

10. (Previously Presented) The apparatus according to claim 9, wherein the decoding device is further configured to pass a symbol probability to the processing device to iteratively decode each of the plurality of symbols.

11. (Currently Amended) The apparatus according to claim 9, further comprising ~~including~~ a hard decision unit configured to determine the plurality of symbols based upon a soft output from the decoding device.

12. (Currently Amended) A method of signal processing for a multiple input multiple output (MIMO) system comprising:

receiving a composite signal indicative of a plurality of symbols;

performing a QR decomposition upon a channel gain matrix for the composite signal to identify a Q matrix and an R matrix;

defining an enumeration constraint of the R matrix, wherein the enumeration constraint comprises a number of entries in the R matrix over which the plurality of symbols are enumerated;

calculating possible conditional probabilities for one of the plurality of symbols contained within the composite signal, using the enumeration constraint; and

iterating said calculating incorporating a most probable symbol for the one symbol determined in a previous iteration of the conditional probability calculation.

13. (Currently Amended) The method according to claim 12, further comprising ~~including~~ setting the enumeration constraint to encompass a sub-set of possible transmit antennas.

14. (Currently Amended) The method according to claim 12, wherein ~~including~~ ~~defining~~ the enumeration constraint is defined as a number of elements within the [[an]] R matrix over which the one symbol is enumerated, wherein the Q matrix comprises an orthogonal matrix, and wherein the QR decomposition comprises the R matrix and the ~~an orthogonal~~ Q matrix.

15. (Previously Presented) The method according to claim 12, wherein the possible conditional probabilities are calculated to determine a most probable symbol received over a given transmission channel.

16. (Currently Amended) The method according to claim 15, further comprising ~~including~~ converting the possible conditional probabilities to bit level logarithmic ~~logarithm~~ likelihood ratios (LLR's).

17. (Currently Amended) The method according to claim 16, further comprising ~~including~~ converting a plurality of parallel streams of bit level LLR's to a serial stream of bit level LLR's.

18. (Currently Amended) The method according to claim 17, further comprising ~~including~~ deinterleaving the bit level LLR's from the serial stream of bit level LLR's.

19. (Cancelled)

20. (Currently Amended) The method according to claim 12, further comprising ~~including~~ making a hard determination of a received symbol based upon a soft output from calculating the possible conditional probabilities.

21. (Currently Amended) A method of reducing a computational load of a signal processor in a multiple input multiple output (MIMO) architecture comprising ~~including~~ a plurality of transmission elements and a plurality of receiving elements, wherein the method comprises:

receiving composite signals having spatial diversity from each of the plurality of receiving elements;

constructing an n by m channel matrix from values indicative of channel gains between each of the plurality of transmission elements and each of the plurality of receiving elements, wherein n denotes a number of the plurality of receiving elements, and wherein m denotes a number of the plurality of transmission elements;

executing a QR decomposition upon the channel matrix to form an upper triangular R matrix and a unitary Q matrix;

enumerating to determine probabilities of a given symbol being transmitted from a given transmission element of the plurality of transmission elements using a constrained data sub-set of the triangular R matrix; and

making a hard decision about which is the most probable symbol to have been transmitted from the given transmission element so as to reduce a number of enumerations required to carry out a further probability calculation.

22. (Currently Amended) The method according to [[of]] claim 21, further comprising ~~including~~ using sub-optimally determined symbol values to generate final definite symbol values.

23. (Currently Amended) A computer readable medium having stored therein computer executable instructions, wherein the instructions are executable by a processing unit to ~~that~~ cause the processing unit to perform operations comprising:

receiving a composite signal indicative of a plurality of symbols;

performing a QR decomposition upon a channel gain matrix for the composite signal, wherein the QR decomposition comprises an upper triangular R matrix and an orthogonal Q matrix;

defining an enumeration constraint of the R matrix, wherein the enumeration constraint comprises a number of entries in the R matrix over which the plurality of symbols are enumerated;

calculating possible conditional probabilities for one of the plurality of symbols contained within the composite signal, using the enumeration constraint; and

iterating said calculating incorporating a most probable symbol for the one symbol determined in a previous iteration of the conditional probability calculation.

24. (Cancelled)

25. (Currently Amended) The computer readable medium according to [[of]] claim 23, wherein the plurality of symbols are transmitted by four or more transmitting elements, wherein the composite signal is received by four or more receiving elements, and wherein the operations further comprise:

calculating a conditional symbol probability for a fourth receiving element based on channel information received for a third receiving element and the fourth receiving element to determine a fixed value for a symbol with a highest conditional probability for the fourth receiving element; and

calculating a conditional symbol probability for the third receiving element based on channel information received for a second receiving element and the third receiving element and based on the fixed value, wherein the conditional symbol probability for the third receiving element cancels out interference from a fourth transmitting element.

26. (Previously Presented) An apparatus comprising:

means for receiving composite input signals having spatial diversity from each of a set of n receiver elements;

means for constructing an n by m channel matrix from values indicative of channel gains between each transmit and receive element, wherein m denotes a number of transmission elements;

means for executing a QR decomposition upon the channel matrix to form an upper triangular R matrix and a unitary Q matrix; and

means for enumerating to determine probabilities of a given symbol being transmitted from a given transmission element using a constrained data sub-set of the triangular R matrix.

27. (Currently Amended) The apparatus according to [[of]] claim 26, wherein the constrained data sub-set ~~enumeration constraint~~ comprises a number of entries in the triangular R matrix over which the given symbol is enumerated.

28. (Currently Amended) The method according to [[of]] claim 14, wherein the R matrix comprises an upper triangular structure of non-zero elements and a lower triangular structure of zero elements.